



EARLY CHILDHOOD
SUMMIT 2016
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Say What?!

Meeting the Needs of
Young Children with
Hearing Loss

Jacqueline Busen, Au.D. Jacqueline.Busen@asu.edu

Vijette Saari, M.Ed. vsaari@azftf.gov

Carla Zimmerman, M.N.S. carla@zimmermanspeech.com

Overview

- Introduction to hearing loss in children
- Impact of hearing loss
- Impact of early intervention
- Challenges for children in Arizona

Hearing Loss: The Numbers

Hearing Loss: The Numbers

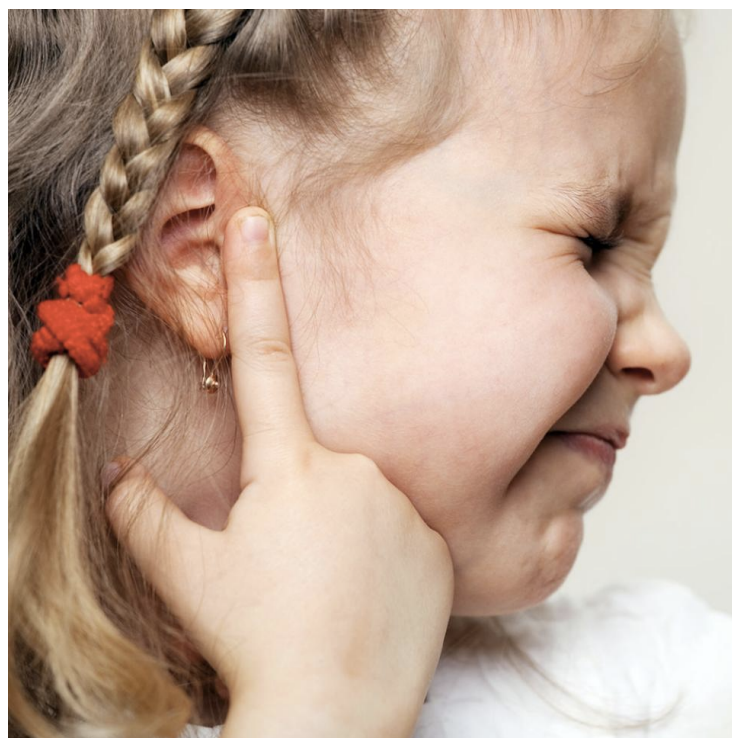
2-3/1000 children are born with permanent hearing loss

More than 90% of these children are born to normal hearing parents

Source: National Institute on Deafness and Other Communication Disorders



Hearing Loss: The Numbers



5/6 children experience
ear infections by the
time they are 3 years old

Photo: <http://www.parenting.com/>

Source: National Institute on Deafness and Other
Communication Disorders

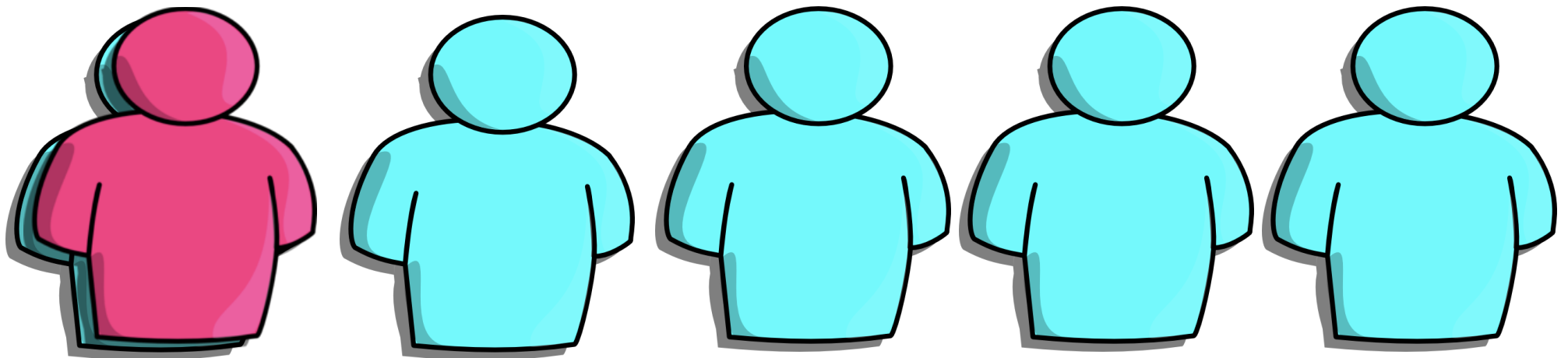
Hearing Loss: The Numbers

1/8 people in the U.S. aged 12+ has hearing loss in both ears



Source: National Institute on Deafness and Other Communication Disorders

Hearing Loss: The Numbers



Source: National Institute on Deafness and Other Communication Disorders

Hearing Loss: The Numbers

- Children with hearing loss are typically born to parents who have normal hearing
- Most children will experience at least one ear infection
- Permanent hearing loss gets more common as children get older

An Introduction to Hearing Loss

How We Hear

1.

Sound waves enter your outer ear and travel through the ear canal to your eardrum.

2.

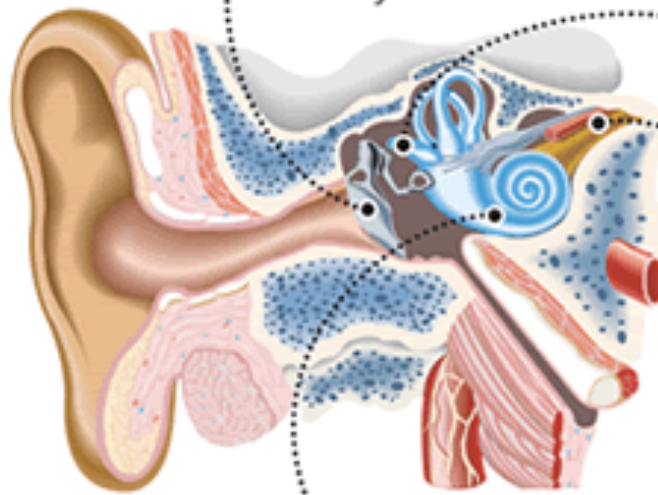
Your eardrum vibrates with the incoming sound and sends the vibrations to three tiny bones in your middle ear.

3.

The bones in your middle ear amplify the sound vibrations and send them to your inner ear, or cochlea. The sound vibrations activate tiny hair cells in the inner ear, which in turn release neurochemical messengers.

4.

Your auditory nerve carries this electrical signal to the brain, which translates it into a sound you can understand.



Describing Hearing Loss

- 1.Type of Hearing Loss
- 2.Degree of Hearing Loss
- 3.Configuration of Hearing Loss

Types of Hearing Loss

Conductive

- Problem in the outer or middle ear

Mixed

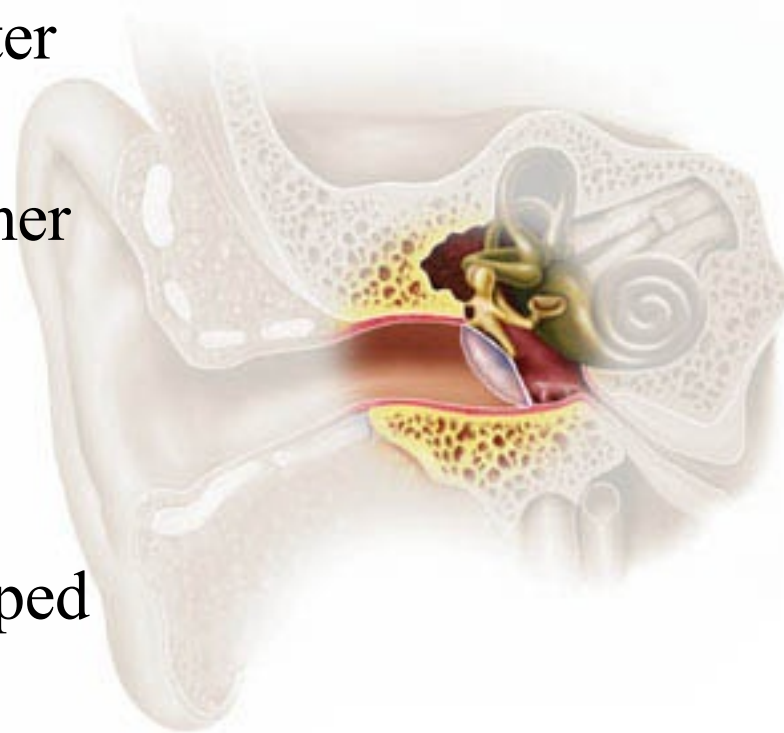
- Problem in the outer or middle ear +
- Problem in the inner ear

Sensorineural

- Sensori (cochlea) + neural (nerve)
- Problem in the inner ear (cochlear and/or nerve)

Types of Hearing Loss

- Four main types of hearing loss
- **1) Conductive Hearing Loss**
 - Caused by an abnormality of the outer or middle ear
 - Disrupts sound conduction to the inner ear
 - Can be temporary or permanent
 - Usually medically treatable
 - If not medically treatable can be helped with hearing aids



Types of Hearing Loss

- **2) Sensorineural Hearing Loss**
 - Caused by an abnormality or damage of the inner ear and/or auditory nerve
 - Sensorineural hearing loss results from missing or damaged sensory cells (hair cells) in the cochlea
 - Usually permanent and not medically treatable
 - Degree of loss can be mild, moderate, severe or profound
 - Mild to severe losses can be helped with hearing aids
 - Severe to profound hearing losses can be helped with cochlear implants



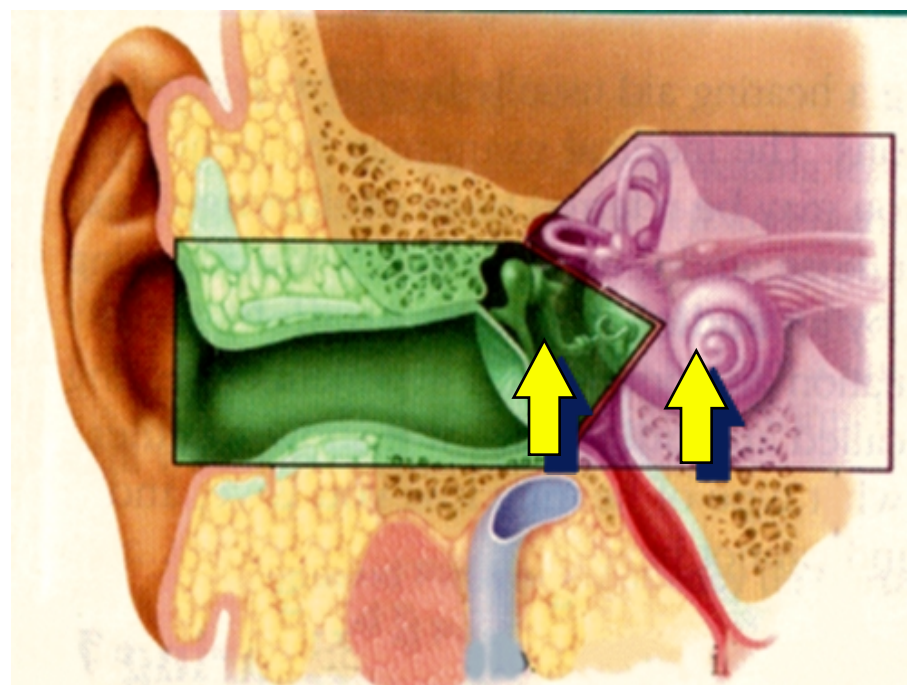
Types of Hearing Loss

- **3) Neural Hearing Loss**
 - Caused by the absence of or damage to the auditory nerve
 - The hearing loss is usually profound and permanent
 - If no auditory nerve exists, hearing aids and cochlear implants cannot help
 - No nerve exists to pass on enough sound information to the brain
 - An auditory brainstem implant may help

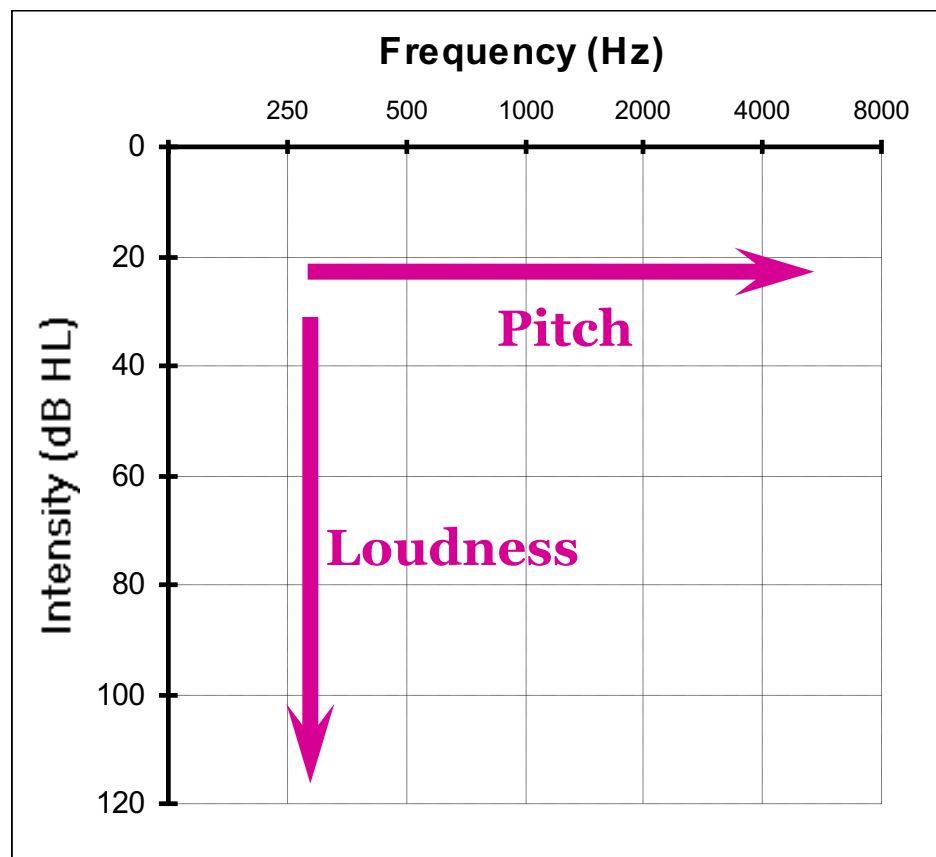


Types of Hearing Loss

- 4) Mixed hearing loss
 - A mixed hearing loss is a combination of conductive and sensorineural hearing loss (problems exist in both the middle and inner ears).

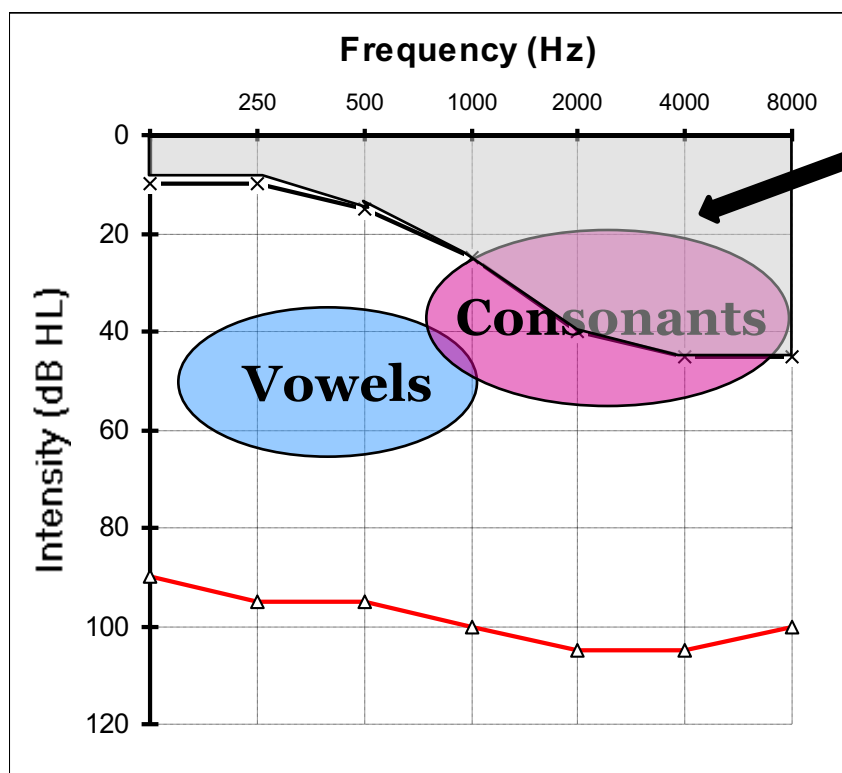


Hearing Test: Audiogram



*Measures
ability to hear
sounds of
varying pitch
and loudness*

Degrees of Hearing Loss: Mild

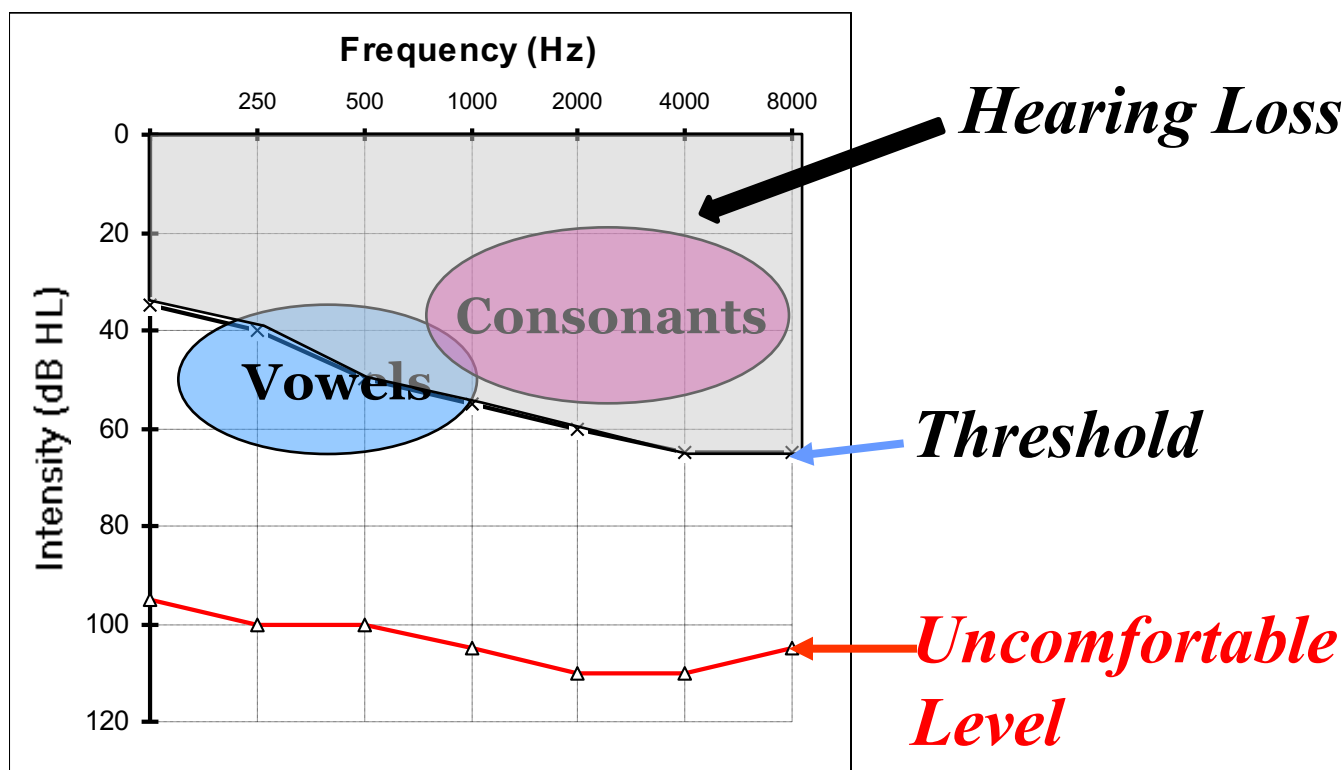


Hearing Loss

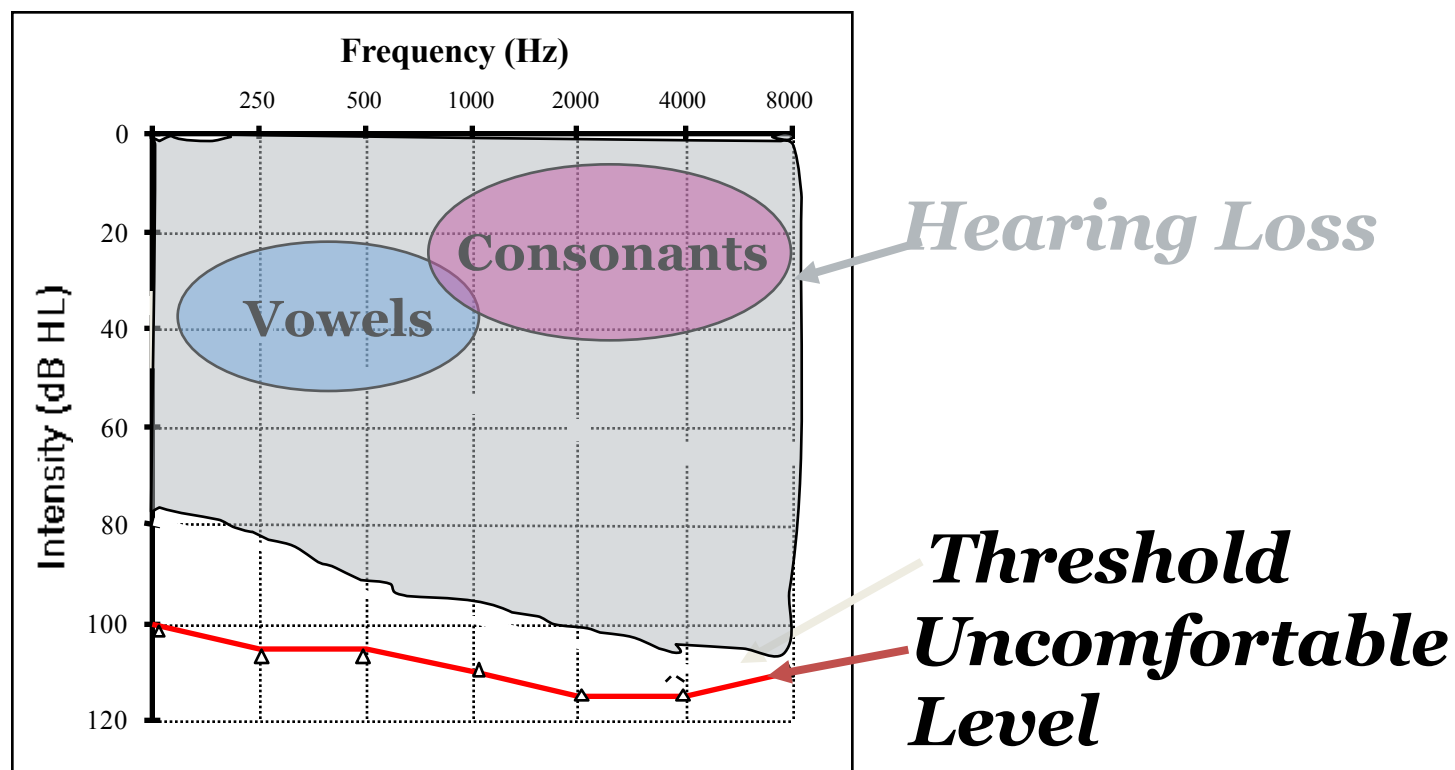
Threshold

Uncomfortable Level

Degrees of Hearing Loss: Moderate



Degrees of Hearing Loss: Profound



What is a conductive
hearing loss like?

Hearing Loss Simulation

- Place foam ear plug in right ear
- Try having a conversation with the person on your right
- Place second foam ear plug in left ear
- Try listening to the next minute of the presentation



How Do We Determine a
Child Has Hearing Loss?

Determining Hearing Loss

Hearing Screening

- Preliminary check to see if further testing is warranted
- Quick
- Cost-effective

Hearing Evaluation

- In-depth assessment of hearing
- Performed by an audiologist
- Determine the nature and degree of hearing loss
- Determine treatment options

Hearing Screening

- People of any age can be screened for hearing loss.
- Newborn infants are now routinely screened before leaving the hospital.
- Most preschoolers and school-age children are screened periodically at their schools or in their doctors' offices.

Who Should Have Hearing Screening?

- Anytime you have a concern about a child's hearing!
- Anyone failing a hearing screening.
- The follow-up evaluation should be conducted as soon as possible after the failed hearing screening

Impact of Hearing Loss

Amplification

- The good news: Children are being identified and fit with amplification much earlier, during critical learning periods.
- The not so good news: The problem is not solved, it's just “managed”
- The amplification is fit to a damaged system

Impact of Hearing Loss

- Mild
 - Sounds nice, but it's serious!
- Moderate
 - Child can “hear” but may miss much of what is said.
- Severe – Profound
 - Individual ability and intensive intervention prior to 6 months of age will determine the degree that sounds detected will be discriminated and understood by the brain into meaningful input.

Unilateral & Mild/Minimal Losses

- These kids are often overlooked.
- Children with unilateral hearing loss are at **10 times the risk** for school problems as those with 2 good ears.
- ANY degree of hearing loss has the potential to disrupt communication and academics.

Communication Modality

- About 95% of deaf children are born to hearing parents.
- About 40% of kids with hearing loss have other handicapping conditions that may or may not be apparent.
- The best communication choice is whatever fits the child and family.
- The key is that the communication option be used consistently.

The Goal – Catch Up & Stay There!

- Areas that are impacted by hearing loss:
 - Language
 - Children have reduced access to language models – Dana Suskind’s Keynote – the child’s brain suffers
 - Specific areas of difficulty
 - Vocabulary, grammar, idiomatic language (“I bumped into him at the store”, “I’d like a hamburger with the works”, “They were all ears”)
 - Speech Production

– Social Skills *Christine Yoshinaga-Itano study*

- Children who are D/HH begin to master pragmatic skills at 6 years of age; 3-year-olds with normal hearing have already mastered nearly half the skills.
- By age 7, children who are D/HH have mastered about 2/3rds of the skills; almost all are mastered by hearing children by age 4.

– Literacy

- Both reading and writing
- BASIS OF EDUCATION

How are kids with HL doing?

- The goal is one year's growth in one year's time
- 80% of D/HH kids attend public school – a minority are using their hearing aids
- Average reading achievement of deaf students completing high school: 4th grade
 - 1/4 read at 5th grade or above
 - About 8% read at 8th grade or above

Predictive Factors

- Degree & type of hearing loss
- Age of onset of the hearing loss
- Age at which amplification is begun
- Intelligence
- Quality & quantity of the language input
- Early intervention

What's changing?

- Early identification and early intervention are GAME CHANGERS.
- We can take advantage of developmental synchrony

Photo: USC Caruso
Family Center



- The tricky part? Making sure appropriate intervention takes place.
 - All providers are not equal – need to be proficient in providing EI to children who are D/HH – when appropriate services are available, kids develop language skills on par with their hearing peers.
- Overcoming distance challenges
 - Tele-intervention is an option

The Potential Outcome...



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Jade's Story



Risk Factors

For Congenital, Late Onset and Progressive Hearing Loss

- ✓ Caregiver concern regarding hearing, speech, language, or developmental delay
- ✓ Family history of permanent childhood hearing loss
- ✓ Neonatal intensive care of more than 5 days or any of the following, regardless of length of stay: extracorporeal membrane oxygenation (ECMO), assisted ventilation, exposure to ototoxic medications or loop diuretics, and hyperbilirubinemia that requires exchange transfusion
- ✓ In utero infections, such as CMV, herpes, rubella, syphilis, and toxoplasmosis
- ✓ Craniofacial anomalies, including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies

- ✓ Physical findings, such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing loss
- ✓ Syndromes associated with hearing loss or progressive or late-onset hearing loss, such as neurofibromatosis, osteopetrosis, and Usher syndrome
- ✓ Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich ataxia and Charcot-Marie-Tooth syndrome
- ✓ Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis
- ✓ Head trauma, especially basal skull/temporal bone fracture that requires hospitalization
- ✓ Children who have received chemotherapy

Jade's Risk Factors



- In utero Parvo 19 viral infection
- Failed newborn hearing screening
- Parent concern of development
- Postnatal infection, suspected meningitis

Hearing Aids

- Used to amplify sound in the better ear
- Used to stimulate the auditory nerve in her deaf ear



Cochlear Implant Surgery

Cochlear Implant Candidacy

Evaluations by:

- Neuro-Otology/Otolaryngologist/Surgeon
- Pediatric Audiologist
- Speech-Language Pathologist/Listening & Spoken Language Specialist

Required Testing:

- Brainstem Auditory Evoked Response Study (BAER) under Anesthesia
- Behavioral Hearing Evaluation
- CT Scan of Internal Structure of the Ear

Support From:

- Teacher of the Deaf
- Family



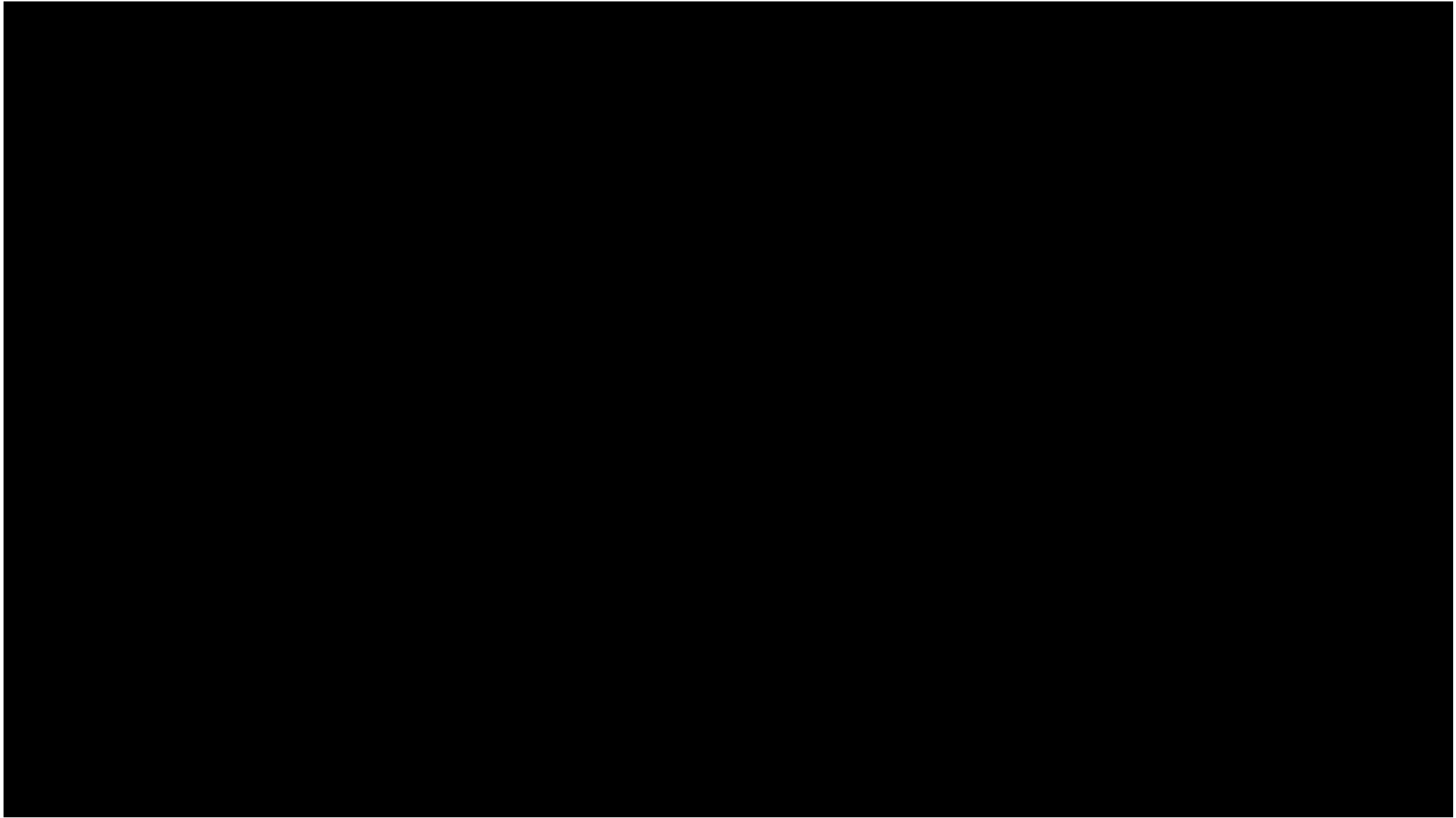
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Cochlear Implant Follow-Up



- Behavioral Hearing Test
- Cochlear Implant Mapping
- Auditory-Verbal Therapy

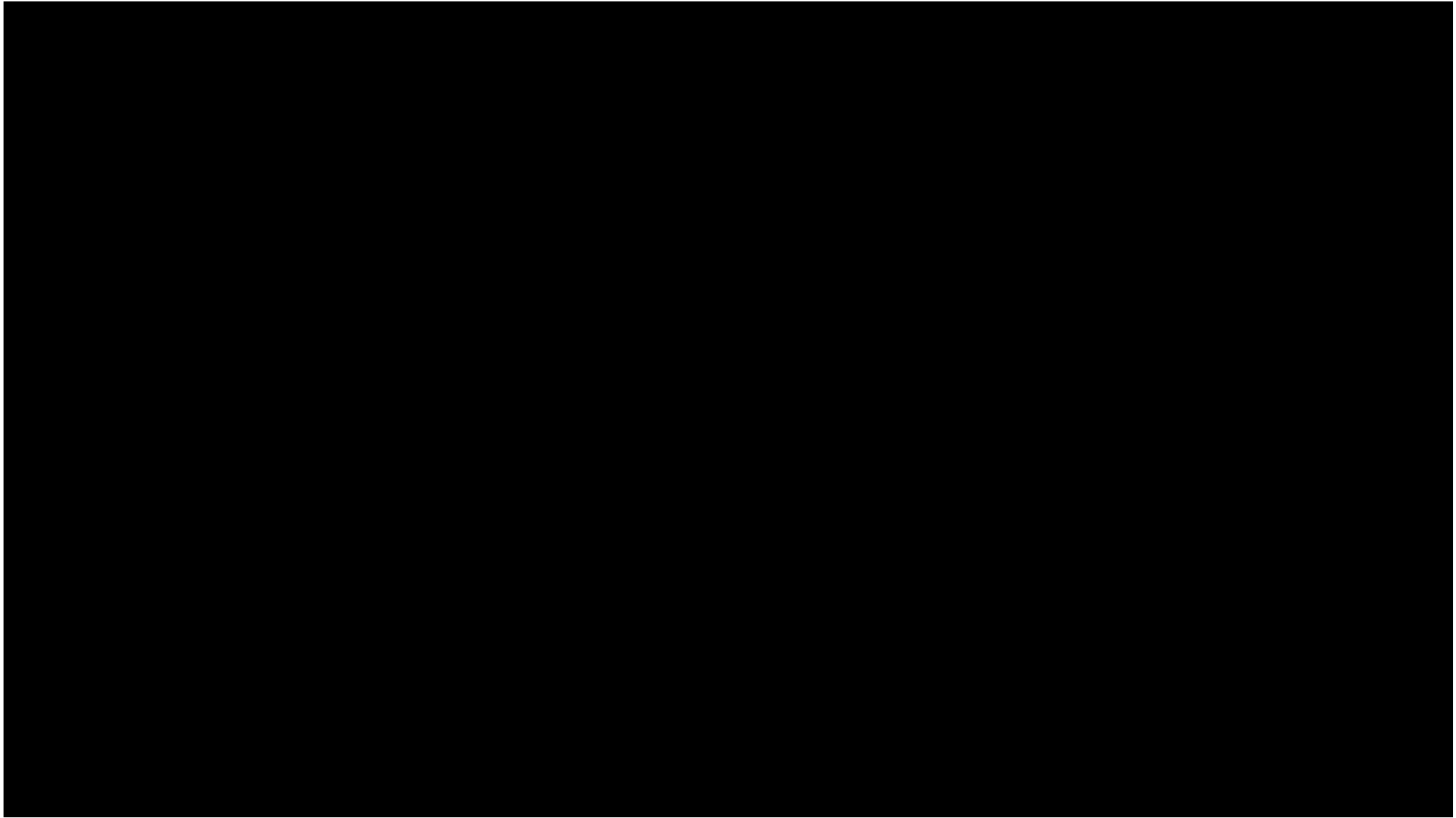




Tele-Intervention

- Pilot program grant through ASDB for children living in rural areas
- Allows access to professionals who have experience working with the deaf/HOH and cochlear implants
- Requires follow through from family, caregivers, and other providers



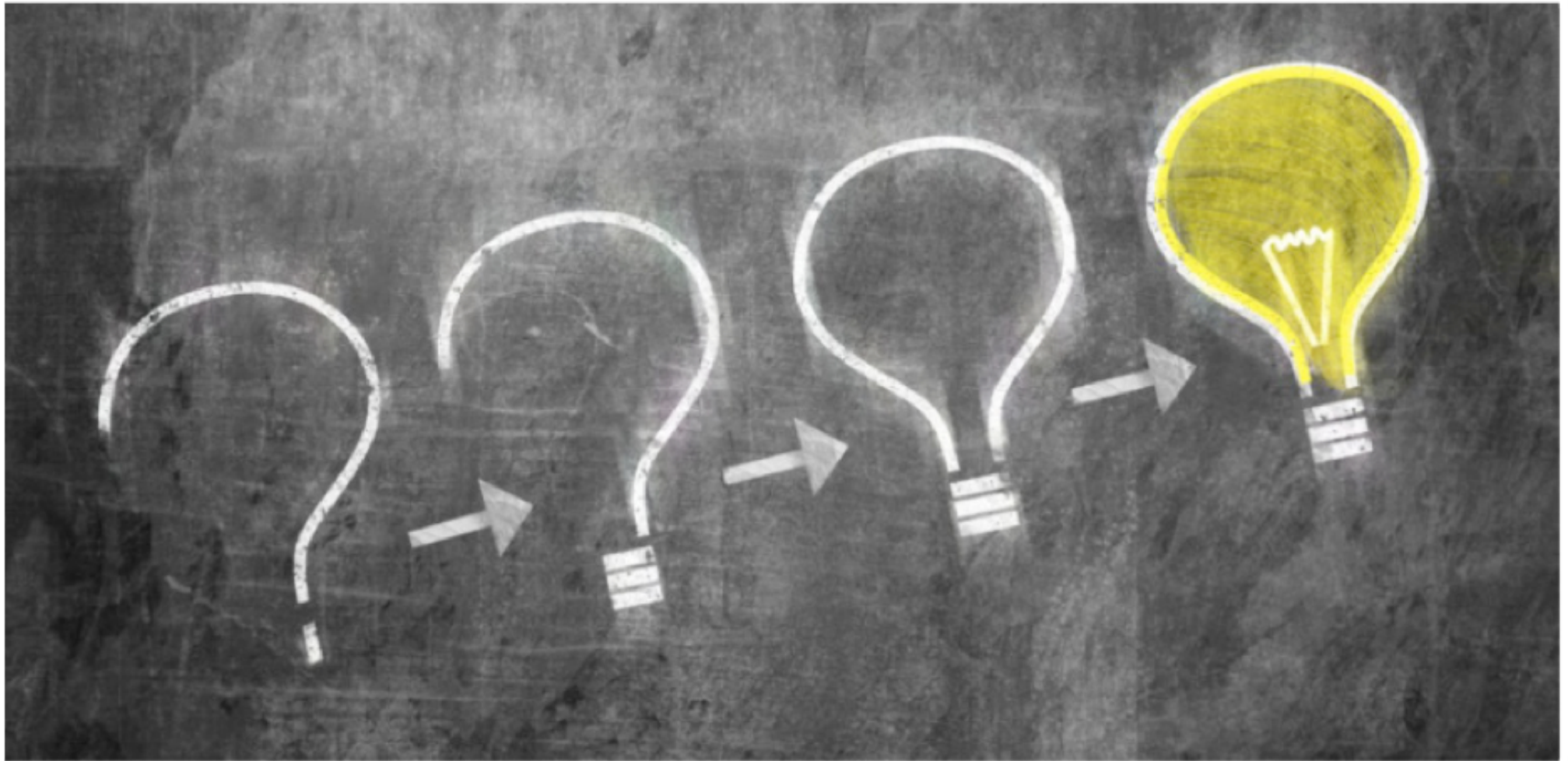


Resources for Families

- The Arizona Early Intervention Program (AzEIP)
- Arizona School for the Deaf and Blind (ASDB)
- Division of Developmental Disabilities (DDD)
- Raising Special Kids Peer-to-Peer program
- Hands and Voices – Arizona Chapter
- The Ear Foundation
- Facebook support groups



Question & Answer Time



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